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Manipulating Raw Data into Tables and Graphs

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CMST SCOLLARCITY Lesson Plan Template-Lesson Plan using **TI Technologies** (Due Tuesday, July 27th)

Submit as hard copy AND electronically through ANGEL

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Grade level(s)/Subject taught: MATH 7th & 8th

Objectives: (Remember…*How will the modeling tool help the student better learn the objective?)*

Objectives: Since this is 7th and 8th grades, my focus will be on getting students used to working with the TI as well as making connections between data in a table and what its graph would look like. The TI will model this type of relationship very well.

The overall objective of this lesson is for students to begin creating the connection between raw data, tables, graphs, and equations. This objective will be reached by students manipulating raw data manually into different models such as tables and graphs, and then using the TI to model their own equation as well as to find the equation the TI comes up with using their raw data. In addition, the students can compare and contrast the equation they came up with and the equation the TI created from their same data. The confirmation / modeling of the TI using the data to come up with the graph and equation will help students see that there is no difference between manipulating the data manually and manipulating the data through the TI. It still remains the same information, creating the same graphs, etc.; and this continuity between the two will be two ways students will work with and "see" the information in many forms. Many students do not see the connections between say, raw data and the graphs, tables, and equations they create. I think modeling this with the TI in addition to manually, will help students begin to develop that connection between many phases in which data can be presented. Since a calculator comes up with the same graph they do, I think this modeling will help students prove to themselves that there is rhyme and reason to math, they just need to look at it differently than in the past. In addition using the trace feature will give students a concrete model of how a line goes on and on, and the equation that goes with the line can solve for answers of any value (to infinite!). Students are used to seeing only one answer, the TI can nicely model the fact that some lines go on and on.

Specific Objectives:

a) Students will be able to make a prediction as to what a linear equation would look like for the relationship between dog years and human years.
b) Students will be able to put their equation into the y = screen and see if the equation they came up with matches the graph they created.
c) Students will be able to put data from their hand made table into the List screen of the TI, display the ensuing graph of the List information using ZOOMSTAT and PLOT, and compare that graph to the one they created.
d) Students will be able to compare the y = screen equation they came up with to the one the TI came up with, and describe the ways they are the same and the ways they are different and explain (analyze) why they are alike and/or different.
e) Students will be able to use the Trace feature on the TI to find values for years not included in their tables.
f) Students will learn that a line goes on and on, it doesn't end at the end of the graphs they create by hand.

Items to include in your TI Technologies lesson plan: (use *your* area/discipline/concepts).

For the math teacher:

1. *Write* the Mathematical Concept or "key idea" that TI Technologies will be used to teach: (e.g. Students use mathematical modeling/ multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships)

Key Idea #7 Patterns/Functions, B:
Describe and represent patterns and functional relationships, using tables, charts, graphs, algebraic expressions, rules, and verbal descriptions. Includes: Organize and analyze data resulting in function applications through use of a table of values, sentence, formula, graph and prediction.

and/or…

For the Science teacher:

1b. *Write* the Science Concept or "key idea" that TI Technologies will be used to teach: (e.g. Organisms maintain a dynamic equilibrium that sustains life).

For your **TI Technologies** lesson and using the following prompts, please provide a rich **one-page, single-spaced** description or a *vision* of your best thinking on a way or ways you might teach the planned lesson using the TI technology. Pay special attention to the modeling package in your description. Also, construct and submit a tentative rubric that you might use with your students. ** see example page 5

"...a rich **one-page, typed, single-spaced**, description or a *vision* of your best thinking…"

Prompts:

1. How will you assess the prior knowledge of the student?
2. How will you begin the lesson?
3. What are the teacher and students doing every 5-10 minutes? (Teacher Actions and Student Actions
4. How will you assess the learning for the lesson?
5. How will TI be integrated into your teaching? (i.e. you may want to discuss a problem or describe how you might use the chosen modeling package in your plan. How does the model/tool help the concept(s) to be taught)?

Using _____TI Calculator_____, I plan on having my students…
(software / modeling package(s)

Prior Knowledge needed: Students will have had experience solving linear equations in the form of y = mx + b, and putting the information into a table and then into a graph. I am using the relationship of dog years to human years becau this information should be fairly familiar to the students, so they should have some idea of what the graph should look lik

Vision: My students would be working in groups of 4 for this lesson. I would begin the lesson by activating my students' prior knowledge by asking them what a linear equation is, what one form the linear equation can take (y = mx + b), how to put raw data into a table and decide which is the X and which is the Y, then how to put that information into a graph. This would be a brainstorming session which will create the reference information students will need to use throughout the lesson. I will have their answers written on the board to be referred to throughout the lesson.

Next, I would have my students begin working in their groups to complete the table of information of the relationship between dog years and human years. In their groups, they would need to decide what to label X and what to label Y and write down an explanation of why they chose what they did. This will become one part of their presentation to the class, their reasoning of why they chose what they did. When their table of values is complete, they will need to create a graph of the information.

When students have completed these tasks, I will put the completed table up onto the overhead for students to see to be sure everyone has the same values, then I will put the graph of the information onto the overhead to make sure everyone is on the same page. During this whole group part, we will be discussing X and Y values and why we chose what we did for the graph (Some may need to change what they have if they chose to do the opposite X & Y).

Here we will begin to discuss the equation y = mx + b and what the different parts of the equation are, the slope, the x and the b in particular. Once we are reminded of this information, the groups will begin to come up with their prediction of what the equation for this data will look like. Once students create an equation (at this point I don't care if they are correct or not), they will go to their TI and put it into the Y 2= and see what this equation looks like in graph form by using ZOOM STANDARD. They will verify if their predicted equation looks like their hand created graph. They will also try to come up with a reason it either did, or did not look like the graph they created. Students will then go back to the Y = screen and 'deactivate' Y2 =.

Next, on the overhead with my TI, I will walk them through the steps of putting information into the L1 and L2, turning the plots on to see the individual points. Here again, we will look at the graph this creates and compare and contrast them to our predicted equation graphs and our hand created graphs.

Then I will walk them through the process of graphing the equation using LinReg., and putting the equation into Y1 =. This is not something I am expecting them to remember how to do, I am interested here in the modeling of the equation by the TI and their deductions as to why their graphs were/were not the same as the TI's, and why their equations may or may not have been the same.

Closure: – we will have a whole group discussion and take final notes about:

a) the process of taking data from its raw stage and organizing it into a form we can use to analyze it.
b) We will also discuss how we can use the equation we found to solve for any value of X.

c) How is the information we create by hand the same and/or different from the information we created with the TI.

Timeline: I would guess this lesson would take 2- 80 minute periods, or 3- 60 minute periods.

RUBRIC

TARGET:	ACCEPTABLE	UNACCEPTABLE
Student can explain the relationship between raw data, graphs, tables, and equations.	Student accurately explains the relationship between and gives at least 3 & gives concrete examples.	Student can only explain the relationship between two presentation methods.
Student can explain what a linear equation is, give an example of information that can be represented by a linear equation, and explain why it can be presented that way.	Student accurately gives an example of a linear equation and can explain why it is linear.	Student does not know what linear means and cannot ID any information that can be represented linearly.
Student can explain what a linear graph looks like and explain why it looks that way.	Student accurately describes what a linear graph looks like and makes and/ or can explain why it looks that way.	Student cannot identify a linear graph.
Student can explain why a linear equation can be used to solve for any value of X.	Student accurately describes how to use a linear equation to solve for any value if X.	Student does not know to put different values of X into a linear equation.
Given a table of data, student can say whether it is a linear table, and can make a sound attempt to come with an equation that can possibly model the data.	Student can identify if a table of data is linear and/or can attempt to create the equation that goes with the table.	Student cannot identify if a table is linear.
Student can explain how to get to the Y = screen on the TI, enter an equation, and create a graph from the Y = screen.	Student can show you how to use the TI to get to the Y = screen to enter an equation and make a graph from there.	Student does not know how to put an equation into the Y = screen.

Example: "I was thinking about beginning the class on [modeling X] by using the overhead to ask students what they know about X. From this brainstorming session, I might ask them to get into groups and discuss one or more of the ideas they gave me. After about ten minutes, I would have the students give their ideas on X and write them down on a transparency so they would be able to see them for the entire hour. From here, I would provide a 10 to 15 minute demonstration of the basics of using _____modeling software. I would use an conceptual example that they would find familiar with such as getting a cold and how it is transmitted. From here, I would have students at the computer stations using a prepared guide or tutorial to get them started on basic software usage. I expect that in a short time a number of students would "catch on" rather quickly and be able to help others. …….. By the third lesson, I suspect that most would be well on their way to development of their own or small group models using the _____software. My plan of assessment would probably be a group model so they would gain more confidence in using the software in a meaningful way. After the second or third lesson, I would ask them to choose from a list of thematic or topic areas that fit the software nice and develop a model using the technology. As a product, I may have partners share their model and describe to other small groups how it works. The rubric I design would be general at first so that I might see the kinds of the products the student were capable of creating. From the prototypes, I would hone my rubric to make the modeling product as challenging as possible without making it too difficult." Etc…

For all lesson plans and within the context of the lesson plan(s) you develop, design (add) a rubric that addresses your objectives AND "guides" your students to success in the modeling arena you choose (AS, Stella, GSP, TI, IP). The rubric should have three or four levels or mastery with the highest level [TARGET], which should detail what you might initially expect of the capabilities from a student doing the best s/he can do. **(etc…)**

Ex:

Target	Acceptable	Unacceptable
Model *uses at least 5 functions* of Agent Sheet Software.	?	?
Math / Science Concept thoroughly addressed. Described (*written*) in rich detail.		
Graphs are neat, accurate and based on data from the model.	?	?
Student is very capable of *describing the model to a small group of peers* and is able to respond meaningfully to questions about the model.	?	?
Defines exactly how the modeling software "helped" solve the problem.		